

# National Advisory Committee for Aeronautics

## Research Abstracts

NO. 39

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### CURRENT NACA REPORTS

NACA Rept. 1072

INELASTIC COLUMN BEHAVIOR. John E. Duberg and Thomas W. Wilder, III. 1952. iii, 10p. (NACA Rept. 1072. Formerly TN 2267)

This paper presents the significant findings of a theoretical study of column behavior in the plastic stress range that shows the tangent-modulus load to be the load at which bending can start for a straight column. Load-deflection analyses are made for two column models - one model having a concentrated flexibility and the other having its flexibility distributed along its length. Results are presented which relate the maximum load to the stress-strain curve of the material.

NACA Rept. 1079

SOUND FROM A TWO-BLADE PROPELLER AT SUPERSONIC TIP SPEEDS. Harvey H. Hubbard and Leslie W. Lassiter. 1952. ii, 9p. diags., photos. (NACA Rept. 1079. Formerly RM L51C27)

Propeller sound measurements at static conditions have been extended to a tip Mach number of 1.30. Spectrums have been obtained at both subsonic and supersonic tip speeds for comparison, and the measured data are compared with calculations by the Gutin theory. At supersonic tip speeds, the maximum intensities were measured in the plane of rotation and the spectrums are noted to contain a large high-frequency content. At supersonic tip speeds the over-all sound pressures, at a given power to the propeller, were noted to be independent of tip speed. The Gutin theory was found to be adequate for predicting the intensities of the lower-order harmonics but overestimates the intensities of the higher-order ones at supersonic tip speeds.

NACA Rept. 1084

COMPARISON OF HIGH-SPEED OPERATING CHARACTERISTICS OF SIZE 215 CYLINDRICAL-ROLLER BEARINGS AS DETERMINED IN TURBOJET ENGINE AND IN LABORATORY TEST RIG. E. Fred Macks and Zolton N. Nemeth. 1952. ii, 12p. diags., photos., tab. (NACA Rept. 1084. Formerly RM E51I05)

Inner- and outer-race cooling-correlation curves were obtained for the turbojet-engine turbine-roller bearing with the same inner- and outer-race cooling-

correlation parameters and exponents as those determined for the test-rig bearing. The inner- and outer-race turbine roller-bearing temperatures may be predicted from a single curve regardless of variations in speed, load, oil flow, oil inlet temperatures, oil inlet viscosity, oil-jet diameter, or any combination of these parameters.

NACA TN 2892

A RAPID METHOD FOR ESTIMATING THE SEPARATION POINT OF A COMPRESSIBLE LAMINAR BOUNDARY LAYER. Laurence K. Loftin, Jr. and Homer B. Wilson, Jr. February 1953. 19p. diags. (NACA TN 2892)

A method which permits the rapid estimation of the separation point of a compressible laminar boundary layer has been developed. The method is generally applicable to any two-dimensional flow which satisfies the classical boundary-layer assumptions. Calculations made with the use of the method indicate that the amount of velocity recovery possible before laminar separation occurs decreases as the Mach number increases.

NACA TN 2893

THEORETICAL AND MEASURED ATTENUATION OF MUFFLERS AT ROOM TEMPERATURE WITHOUT FLOW, WITH COMMENTS ON ENGINE-EXHAUST MUFFLER DESIGN. Don D. Davis, Jr., George L. Stevens, Jr., Dewey Moore and George M. Stokes. February 1953. iii, 111p. diags., photos., 4 tabs. (NACA TN 2893)

Equations are presented for the attenuation characteristics of several types of mufflers. Experimental curves of attenuation plotted against frequency are presented for 77 different mufflers and the results are compared with theory. The experiments were made at room temperature without flow and the sound source was a loud-speaker. A method is given for including the tail pipe in the calculations. The application of the theory to the design of engine-exhaust mufflers is discussed, and charts have been included for the assistance of the designer.

NACA TN 2895

EFFECT OF VARIABLE VISCOSITY AND THERMAL CONDUCTIVITY ON HIGH-SPEED SLIP FLOW BETWEEN CONCENTRIC CYLINDERS. T. C. Lin and R. E. Street, University of Washington. February 1953. 122p. diags. (NACA TN 2895)

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629.13082

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The differential equations of slip flow, including the Burnett terms, were first solved by Schamberg assuming that the coefficients of viscosity and heat conduction of the gas were constants. The problem is solved herein for variable coefficients of viscosity and thermal conductivity by applying a transformation leading to an iteration method. The method, starting with the solution for constant coefficients, enables one to approximate the solution for variable coefficients very closely after one or two steps. Satisfactory results are shown to follow from Schamberg's solution by using his values of the constant coefficients multiplied by a constant factor  $\eta$ , leading to what are denoted as the effective coefficients of viscosity and thermal conductivity.

## NACA TN 2897

EVALUATION OF GUST RESPONSE CHARACTERISTICS OF SOME EXISTING AIRCRAFT WITH WING BENDING FLEXIBILITY INCLUDED. Eldon E. Kordes and John C. Houbolt. February 1953. 31p. diagrs., 2 tabs. (NACA TN 2897)

Calculation studies made by means of the analysis presented in NACA TN 2763 to evaluate the influence that wing bending flexibility has on the structural response due to gust are reported for three twin-engine transports and one four-engine bomber. The manner in which dynamic response factors for acceleration and bending moment vary with various assumed operational factors is shown. Factors investigated include gust-gradient distance, gust shape, spanwise mass distribution, forward velocity, altitude, and compressibility and aspect-ratio corrections. A limited correlation of some of the calculated results with flight data is also presented.

## NACA TN 2898

THEORETICAL CALCULATION OF THE PRESSURE DISTRIBUTION, SPAN LOADING, AND ROLLING MOMENT DUE TO SIDESLIP AT SUPERSONIC SPEEDS FOR THIN SWEEPBACK TAPERED WINGS WITH SUPERSONIC TRAILING EDGES AND WING TIPS PARALLEL TO THE AXIS OF WING SYMMETRY. Kenneth Margolis, Windsor L. Sherman and Margery E. Hannah. February 1953. 70p. diagrs., tab. (NACA TN 2898)

On the basis of linearized supersonic-flow theory, equations for the pressure distribution have been derived for thin, sweptback, tapered wings sideslipping at a constant angle of attack. The analysis is applicable to plan forms for which the wing tips are parallel to the axis of wing symmetry and at supersonic speeds for which the wing trailing edge is supersonic. A minor restriction is that the Mach cones emanating from the opposite side edges may not intersect on the wing. The plan form with both leading edges subsonic has been analyzed in detail. Equations for the span loading, rolling moment, and the corresponding stability derivative  $C_{l\beta}$  have been obtained. Illustrative span loadings and variations

of the derivative  $C_{l\beta}$  with Mach number are presented for a number of wings.

## NACA TN 2899

MEASUREMENTS OF FLYING QUALITIES OF AN F-47D-30 AIRPLANE TO DETERMINE LONGITUDINAL STABILITY AND CONTROL AND STALLING CHARACTERISTICS. Christopher C. Kraft, Jr., R. Fabian Goranson and John P. Reeder. February 1953. 75p. photos., diagrs., 2 tabs. (NACA TN 2899)

Flight tests were made of the flying qualities of an F-47D-30 airplane to determine the longitudinal stability and control and stalling characteristics.

## NACA TN 2900

THE CALCULATION OF PRESSURE ON SLENDER AIRPLANES IN SUBSONIC AND SUPERSONIC FLOW. Max. A. Heaslet and Harvard Lomax. March 1953. 25p. diagrs. (NACA TN 2900)

Under the assumption that a wing, body, or wing-body combination is slender or flying at near sonic velocity, expressions are given which permit the calculation of pressure in the immediate vicinity of the configuration. The disturbance field, in both subsonic and supersonic flight, is shown to consist of two-dimensional disturbance fields extending laterally and a longitudinal field that depends on the streamwise growth of cross-sectional area. A discussion is also given of couplings, between lifting and thickness effects, that necessarily arise as a result of the quadratic dependence of pressure on the induced velocity components.

## NACA TN 2901

AN ANALYSIS OF THE FACTORS AFFECTING THE LOSS IN LIFT AND SHIFT IN AERODYNAMIC CENTER PRODUCED BY THE DISTORTION OF A SWEEP WING UNDER AERODYNAMIC LOAD. Charles W. Mathews and Max C. Kurbjun. March 1953. 65p. diagrs. (NACA TN 2901)

Results of a simplified analysis of the factors affecting the loss in lift and shift in aerodynamic center of a swept wing due to its bending under aerodynamic load are presented as charts which relate the stress and aeroelastic effects considered to the wing structural weight, external geometry, material, and flight condition. Illustrative examples of the magnitudes of the aeroelastic effects to be expected are presented for typical swept wings. The manner in which these aeroelastic effects influence the longitudinal stability of an airplane is also considered.

NACA TN 2906

AN AIRBORNE INDICATOR FOR MEASURING VERTICAL VELOCITY OF AIRPLANES AT WHEEL CONTACT. Robert C. Dreher. February 1953. 19p. diagrs., photos. (NACA TN 2906)

An investigation has been made with an airborne vertical-velocity indicator in order to determine the accuracy and practicability of such an indicator. A prototype installation was tested under controlled conditions in the Langley impact basin and by means of flight tests with a small trainer-type airplane. A second more compact installation which is retractable was developed for use on a high-speed jet bomber. A description of the operation of the indicator is given. The data obtained and an evaluation of the indicator are presented and show that this type of vertical-velocity indicator is accurate and practical for obtaining vertical velocities at the instant of airplane wheel contact.

NACA TN 2907

EFFECT OF HORIZONTAL-TAIL SPAN AND VERTICAL LOCATION ON THE AERODYNAMIC CHARACTERISTICS OF AN UNSWEPT TAIL ASSEMBLY IN SIDESLIP. Donald R. Riley. February 1953. 39p. diagrs., photos., tab. (NACA TN 2907)

Wind-tunnel results on the effect of horizontal-tail span and vertical location of the horizontal tail relative to the vertical tail on the aerodynamic characteristics of an unswept vertical-tail assembly in sideslip are presented. By applying the well-known discrete-horseshoe-vortex method used for wings to the problem of intersecting surfaces, theoretical span loadings were obtained for each of the configurations tested. Calculated values obtained from the span loadings are compared with experimental results.

NACA TN 2909

STUDY OF SECONDARY-FLOW PATTERNS IN AN ANNULAR CASCADE OF TURBINE NOZZLE BLADES WITH VORTEX DESIGN. Harold E. Rohlik, Hubert W. Allen and Howard Z. Herzig. March 1953. 29p. diagrs., photos. (NACA TN 2909)

In order to increase understanding of the origin of losses in a turbine, the secondary-flow components in the boundary layers and the blade wakes of an annular cascade of turbine nozzle blades (vortex design) were investigated. A detailed study was made of the total-pressure contours and, particularly, of the inner-wall loss cores downstream of the blades. The inner-wall loss core associated with a blade of the turbine-nozzle cascade is largely the accumulation of low-momentum fluids originating elsewhere in the cascade. This accumulation is effected by the secondary-flow mechanism which acts to transport the low-momentum fluids across the channels on the walls and radially in the blade wakes and boundary layers. The patterns of secondary flow were determined by use of hydrogen sulfide traces,

paint, flow fences, and total-pressure surveys. At one flow condition investigated, the radial transport of low-momentum fluid in the blade wake and on the suction surface near the trailing edge accounted for 65 percent of the loss core; 30 percent resulted from flow in the thickened boundary layer on the suction surface and 35 percent from flow in the blade wake.

NACA RM E52L05

PRELIMINARY COMPARISON OF 17- AND 75-MILLIMETER-BORE CAGELESS CYLINDRICAL ROLLER BEARINGS WITH CONVENTIONAL CYLINDRICAL ROLLER BEARINGS AT HIGH SPEEDS. E. Fred Macks, W. J. Anderson and Zolton N. Nemeth. March 1953. 39p. diagrs., photos., tab. (NACA RM E52L05)

Preliminary results at high speeds indicate lower bearing temperatures, less internal bearing wear, and greater reliability of the conventional, cage-type cylindrical roller bearings than of either full-complement or special cageless roller bearings of the types investigated, although the latter bearing types have been operated successfully to DN values of  $1.0 \times 10^6$ .

NACA RM E52L24a

SMOKE STUDIES OF SECONDARY FLOWS IN BENDS, TANDEM CASCADES, AND HIGH-TURNING CONFIGURATIONS. Arthur G. Hansen, Howard Z. Herzig and George R. Costello. March 1953. 33p. photos., diagr. (NACA RM E52L24a)

Flow-visualization studies, using smoke, were made of the secondary flows in rectangular bends, tandem cascades, and high-turning configurations. The roll-up of the wall boundary layer of a rectangular bend forms a passage vortex near the suction surface similar to that previously observed for cascades. The vortex so formed then shifts out into the main stream. Because of leading-edge effects, the boundary-layer flows in bends were found to be sufficiently different from the flows in blade rows to make direct application of bend results to blade rows inadvisable. Passage vortices are shown, in the tandem-cascade study, to resist turning with the main stream through which they pass and to disturb the flow in subsequent blade rows. This disturbance may explain in part the appreciable size of the losses sometimes attributed to secondary flows in turbomachines despite the fact that the energy involvement in vortex formation is slight. Tip-flow studies of high-turning blades with relative motion between blades and end wall indicated that if the relative sizes of the passage vortex forces, the tip clearance forces, and the blade-scraping effects are properly controlled, it may be possible to improve the blade-tip loading characteristics in turbomachine.



NACA RM E53A22

AN ANALYTICAL STUDY OF HEAT REQUIREMENTS FOR ICING PROTECTION OF RANDOMES. James P. Lewis. March 1953. 20p. diags. (NACA RM E53A22)

The heat requirements for the icing protection of two radome configurations have been studied over a range of design icing conditions. Both the protection limits of a typical thermal protection system and the relative effects of the various icing variables have been determined. For full evaporation of all impinging water, an effective heat density of 14 watts per square inch was required. When a combination of the full evaporation and running wet surface systems was employed, a heat requirement of 5 watts per square inch provided protection at severe icing and operating conditions.

## BRITISH REPORTS

N-13437\*

Aeronautical Research Council (Gt. Brit.)  
THE BOUNDARY LAYER WITH DISTRIBUTED SUCTION. M. R. Head. April 2, 1951. 118p. diags., photos., 4 tabs. (ARC 13,897; FM 1547; Perf. 771)

Experiments performed in flight at Reynolds numbers in the region of  $3 \times 10^6$  have clearly demonstrated the stabilizing effect of small amounts of distributed suction on the laminar boundary layer. In the absence of a pressure gradient and in adverse gradients similar to those occurring on a normal airfoil, transition of the boundary layer to the turbulent form has been prevented by the use of such suction quantities as may be expected to lead to very considerable reductions in effective drag. It appears, however, that for extensive laminar flow to be achieved in this way, the surface must be free from such excrescences as would cause transition in the absence of suction. Laminar boundary-layer velocity profiles obtained with suction in the absence of a pressure gradient are found to be in good agreement with those calculated for the flat plate, and the suction quantities required to maintain laminar flow are similar to those suggested by stability theory.

N-16313\*

Royal Aircraft Establishment (Gt. Brit.)  
CHARTS OF THE WAVE DRAG OF WINGS AT ZERO LIFT. T. Lawrence. November 1952. 22p. diags. (RAE Tech. Note Aero 2139, rev.)

Theoretical calculations of the wave drag at supersonic speeds of nonlifting wings of double wedge and biconvex section are reviewed, and the best method of presenting the results considered. Using this method, a representative selection of the available numerical evaluations of the theory is presented. These should be of value for wing drag estimation purposes.

N-20663 \*

Aeronautical Research Council (Gt. Brit.)  
SOME PRELIMINARY RESULTS FROM V-G RECORDERS INSTALLED IN MILITARY AND CIVIL AIRCRAFT. R. Hain Taylor. 1952. 43p. diags., 5 tabs. (ARC R & M 2610; ARC 10,433. Formerly RAE SME 3393; RAE Tech. Note SME 188; ARC 7266; RAE Tech. Note SME 204; ARC 7475; RAE Tech. Note SME 232; ARC 7887; RAE Tech. Note SME 303; ARC 8621; RAE Tech. Note SME 368; ARC 9940)

During the latter half of the 1939-45 war, V-g recorder slides were collected from a number of operational and training aircraft types, and about April 1944, the scope was widened to include some commercial transport aircraft. A number of the results has been given limited circulation as Aeronautical Research Council papers, from heavy bombers in October 1943, from fighters in January 1944, and from twin-engined aircraft in April 1944, and a summary of readings from commercial aircraft in 1946; this report collects these scattered results into one body. Part I outlines the method of collection of the slides, describes the nature of the readings obtained, and their method of presentation, and discusses the results. These are grouped roughly into classes, as heavy bombers, fighters, twin-engined aircraft, training aircraft and commercial transport aircraft, and the possibilities of comparison between different types performing the same role, and between different roles performed by the same basic type, are indicated. Part II is a theoretical consideration of possible methods of analysis and extrapolation; it is pointed out that as the work has developed, first ideas have been enlarged or superseded, and finality is still far off. The advantages and disadvantages of several methods used up to 1946 are discussed, and suggestions are made for subsequent work.

N-20917 \*

Aeronautical Research Council (Gt. Brit.)  
INVESTIGATIONS ON SWEPT AND UNSWEPT WINGS AT HIGH SUBSONIC SPEEDS. J. Ackeret, M. Degen and N. Rott. February 16, 1951. 12p. diags. (ARC 13,788; FM 1525; Perf. 894)

In the high-speed wind tunnel of the Institut of Aerodynamics, E. T. H., Zürich, straight and sweptback wings have been tested at high subsonic speeds. Drag measurements at zero incidence were made on a series of geometrically similar models at the same Reynolds number, which was maintained constant by varying the air density. In this way the theoretical tunnel correction formulas could be checked and an extrapolation made to vanishing tunnel influence; straight and sweptback wings were compared after the corrections had been applied. Two different profile thicknesses (9 percent and 12 percent) were used. The transonic drag - Mach number relation for different thicknesses was found to be in very satisfactory agreement with von Kármán's similarity law.

N-20919\*

Aeronautical Research Council (Gt. Brit.)  
NOTE ON THE EFFECT OF SWEEP AND INTER-  
FERENCE ON THE OVERALL DRAG COEFFICIENT  
OF AN AIRCRAFT AT SUBCRITICAL MACH NUM-  
BERS. J. H. Preston. March 22, 1951. 6p.  
(ARC 13,875; Perf. 769)

The influence of sweep and interference on the over-  
all drag coefficient of an aircraft is discussed. It  
is concluded that the induced drag need only slightly  
exceed the ideal minimum for practical sweptback  
plan forms. The part of the profile drag coefficient  
independent of  $C_L$  may be slightly reduced by sweep,  
and the part proportional to  $C_L^2$  may be considerably  
increased and may be sensitive to the spanwise vari-  
ation of  $C_L$  from the mean value. The drag incre-  
ments due to interference at junctions can be split  
into two parts - a profile loss such as would be  
obtained from a pitot traverse, and an induced loss  
arising from the secondary flows set up in the junc-  
tion. This latter does not seem to have been studied  
in connection with aircraft. Both parts of the inter-  
ference drag may rise steeply with increase of  $C_L$ .  
Correct design of the fairing and the use of boundary-  
layer suction would assist in reducing the inter-  
ference drag.

N-20954 \*

Royal Aircraft Establishment (Gt. Brit.)  
DYNAMICALLY EQUIVALENT CIRCUITS OF  
TRANSDUCERS FEEDING INDUCTIVE RESIST-  
ANCE LOADS. D. O. Burns. August, 1952. 26p.  
diags. (RAE Tech. Note EL. 41)

The dynamic relationship between the input voltage  
and the input current of series self-excited trans-  
ducers has been reported on by various authorities,  
notably Milnes. However, amplifier designers in  
general, and servomechanics in particular, are more  
concerned with the dynamic relationship between in-  
put voltage and output current, especially when feed-  
ing inductive loads such as relays, motor windings,  
etc. In the case of the electronic amplifier, equiv-  
alent circuits, involving the parameters of the  
vacuum tube and the load resistance and inductance,  
which enable the dynamic response of the amplifier  
to be calculated, are now well known. As an exten-  
sion of this field, this report gives the dynamically  
equivalent circuits for transducers, which may be  
used for calculating the dynamic responses of  
magnetic amplifiers feeding inductive resistance  
loads.

N-20960 \*

Marine Aircraft Experimental Establishment  
(Gt. Brit.) THE FULL SCALE HYDRODYNAMIC  
PERFORMANCE OF A LARGE FOUR-ENGINED  
FLYING BOAT AT OVERLOAD IN CALM WATER  
AND SWELL. J. A. Hamilton and R. V. Gigg.  
August 1952. 63p. diags., photos., 2 tabs.  
(MAEE F/Res/225)

Tests have been made on a large four-engined flying  
boat (Solent Mk. 3) to determine the hydrodynamic  
performance in sheltered water and in open sea  
swells. The results of general research interest are  
considered in this report. The sheltered water  
characteristics were investigated over a range of  
weights between 72,000 and 84,000 lb. The perform-  
ance in swell covered weights up to 82,000 lb, and  
swell heights up to 5 feet.

N-20964\*

Forest Products Research Lab. (Gt. Brit.)  
INVESTIGATIONS INTO GLUES AND GLUING,  
PROGRESS REPORT SEVENTY-TWO - NOVEMBER  
1952. THE BONDING OF PRESERVATIVE  
TREATED VENEERS WITH PHENOLIC RESIN.  
R. A. G. Knight, L. S. Doman and G. E. Soane.  
6p. 2 tabs. (Forest Products Research Lab.)

This report describes tests made on phenolic-bonded  
plywood with preservatives applied to the individual  
veneers prior to their being bonded together. These  
tests were conducted in order to determine if these  
preservatives interfered with the phenolic resin  
either in its setting action or subsequently.

N-21005 \*

Royal Aircraft Establishment (Gt. Brit.)  
PHYSICAL ENTROPY AND THE ENTROPY OF  
INFORMATION THEORY. G. F. Cawsey.  
February, 1952. 36p. (RAE Tech. Note GW 169)

This note briefly outlines some of the definitions of  
entropy in physics, and considers the interrelations  
of entropy and information in physical and communi-  
cation systems as discussed by Szilard, Brillouin,  
and Shannon. In conclusion, some suggestions are  
offered as to the associations to be made in observa-  
tional and communication systems with the words  
"entropy" and "information."

N-21029\*

Royal Aircraft Establishment (Gt. Brit.)  
THE PRODUCTION OF TRANSDUCER, ACCELE-  
RATION (TELEMETRY) TYPE IT 1-16. October 1951.  
4p. (RAE Specif. IT. 163)

This report presents the RAE specifications for the  
construction, adjustment, testing, marking and  
packing of an acceleration transducer.

N-21034\*

Royal Aircraft Establishment (Gt. Brit.)  
THE EFFECT OF STOVE-ENAMELLING TEMPER-  
ATURES ON ALUMINIUM ALLOYS. G. Meikle and  
J. Thompson. August, 1952. 9p. diags. (RAE  
Tech. Note Met. 166)

The effect of heating the D. T. D. 603 type of alloy at 120°, 165° and 185° C was investigated as these temperatures are liable to be used either for stove-enameiling or for "curing" synthetic resin adhesives. Tests were also made at 120° C on D. T. D. 687 aluminum alloy. Stoving at 120° C is liable to cause a drop of 2 tons/sq in. in proof stress and ultimate tensile stress in D. T. D. 603 and this is not regained except by prolonged heating at 120° C. At 165° C, the improvement due to artificial aging is apparent after 2 hours heating. A temperature of 185° C for an hour is not likely to have much deleterious effect on fully aged D. T. D. 603 (D. T. D. 646) or D. T. D. 610 (D. T. D. 546). Heating D. T. D. 687 at 120° C for a few hours has only a slight deleterious effect.

N-21035\*

Marine Aircraft Experimental Establishment  
(Gt. Brit.) 50 FT. REFUELLER MARK 2 NO. 2133  
PERFORMANCE. November 1952. 14p. diagrs.  
(MAEE F/181, pt. 2)

Full performance measurements were made on 50-ft Refueller Mark 2, No. 2133, fitted with two Perkins S. 6M. engines. The top speed of the craft fully laden is 10 knots, at a fuel consumption of 0.65 nautical m.p.g. The turning circle is about 2-1/4 boat lengths under most conditions, and the emergency stopping distance from full throttle also about 2-1/4 boat lengths. Fuel pumping rates are about the same as for the Mark 1 craft, that is, 20 gallons per minute per 1-1/2 in. hose. The fuel meter is, however, liable to give false indications of the quantity pumped, due to air entering the system. The fuel delivery rates of the craft are much lower than the rating of the pump. The compressed air starting system is barely adequate. Higher pressure cylinders and a larger compressor are desirable.

N-21036\*

Marine Aircraft Experimental Establishment  
(Gt. Brit.) PRELIMINARY PRESSURE MEASUREMENTS DURING THE LANDING OF A SUNDERLAND MARK 5 FLYING BOAT IN ROUGH WATER CONDITIONS INCLUDING ONE ON WHICH THE FOREBODY WAS SEVERELY DAMAGED. R. Parker. Appendix I by W. McClymont. Appendix II by R. Parker. September 1952. 40p. diagrs., photos., 5 tabs.  
(MAEE F/Res/227)

A series of 11 exploratory landings were carried out on a Sunderland Mark 5 flying boat in rough water conditions, during which pressures at various positions on the planing bottom and the c. g. acceleration were measured. Detailed investigations were to be carried out, based on these tests, but the aircraft was severely damaged and this report presents these first results. Analysis of these results shows that pressures occurring in the bow region are of the same order of magnitude as those in the main step region which, in turn, are similar in magnitude to those encountered in high rate of descent landings in calm water conditions. Pressures recorded on the afterbody are invariably much lower than those on the forebody. The greatest risk of damaging the

aircraft occurs when, a short time after touchdown, the aircraft still has considerable forward speed and the pilot little or no control.

N-21044\*

Royal Aircraft Establishment (Gt. Brit.)  
GERMAN WIND TUNNEL TESTS ON TRAILING  
EDGE SPOILERS AT SUBSONIC AND SUPERSONIC  
SPEEDS. H. Voepel. November, 1952. 21p.  
diagrs., 3 tabs. (RAE Tech. Note Aero 2214)

During the war, Herbert Wagner introduced a new aerodynamic controlling device in the form of trailing-edge spoilers, which are especially suitable for guided missiles. Considerable tunnel development of the control was done, but the work has not previously been reported in an accessible form, nor has any analysis of the results been attempted. Such presentation and analysis is given here.

N-21055\*

Royal Aircraft Establishment (Gt. Brit.)  
THE PRODUCTION OF TRANSDUCER, ACCELERATION TYPE IT. 1-22. October 1951. 6p. (RAE Specif. IT. 164)

This report presents a description and RAE specifications for the adjustment, testing, marking, and packing of acceleration transducers.

N-21056\*

Royal Aircraft Establishment (Gt. Brit.)  
THE PRODUCTION OF GYRO, ANGULAR VELOCITY TRANSMITTING TYPE IT. 3-1. January 1952. 5p.  
(RAE Specif. IT. 114)

This report presents the RAE specifications for an angular velocity transmitting gyroscope to be used in conjunction with telemetering equipment, for measuring the rate of angular movement of falling bodies.

N-21057\*

Royal Aircraft Establishment (Gt. Brit.)  
THE PRODUCTION OF PICK-UP, PRESSURE DIFFERENTIAL (VARIABLE INDUCTANCE) TYPE IT. 1-2. April 1949. 5p. diagr. (RAE Specif. IT. 99)

This report contains the RAE specifications for pressure units to be used for the measurement of steady and fluctuating air pressures.

N-21058\*

Royal Aircraft Establishment (Gt. Brit.)  
GYRO, RATE, REMOTE INDICATING TYPE IT. 2-1. April 1947. 5p. (RAE Specif. IT. 80)



This report presents the RAE specifications for a remote indicating gyroscope to be used in aircraft in conjunction with a desynn indicator to measure rates of rotation of the aircraft.

N-21074\*

Royal Aircraft Establishment (Gt. Brit.)  
THE BASIC NOTIONS OF INFORMATION THEORY.  
D. J. Richardson. October, 1952. 27p. (RAE  
Tech. Note GW 214)

A study of available literature on the theory of information has been made. The various notions and terms employed in the theory are gathered together and explained or defined in the text. A list of references is appended.

## MISCELLANEOUS

NACA Rept. 1054

Errata No. 1 on "INTEGRALS AND INTEGRAL  
EQUATIONS IN LINEARIZED WING THEORY."  
Harvard Lomas, Max. A. Heaslet and Franklyn B.  
Fuller. 1951.

NACA Rept. 1062

Errata No. 1 on "INVESTIGATION OF WEAR AND  
FRICTION PROPERTIES UNDER SLIDING CONDI-  
TIONS OF SOME MATERIALS SUITABLE FOR  
CAGES OF ROLLING-CONTACT BEARINGS."  
Robert L. Johnson, Max. A. Swikert and Edmond  
E. Bisson. 1952.

NACA Rept. 1083

Errata No. 1 on "AXISYMMETRIC SUPERSONIC  
FLOW IN ROTATING IMPELLERS." Arthur W.  
Goldstein. 1952.

NACA RM L8H23

Errata No. 1 on "EXPERIMENTAL DETERMINA-  
TION OF THE LATERAL STABILITY OF A GLIDER  
TOWED BY A SINGLE TOWLINE AND CORRELA-  
TION WITH AN APPROXIMATE THEORY." Bernard  
Maggin and Robert E. Shanks. November 12, 1948.

## UNPUBLISHED PAPERS

N-15503\*

Armour Research Foundation.  
STRESS CORROSION IN AIRCRAFT ALLOYS.  
Joseph B. McAndrew and Howard T. Francis.  
(Final rept.) May 29, 1952. i, 24p. photos.  
(Armour Research Foundation)

An attempt has been made to verify the existing theory for the stress corrosion cracking of aluminum 4-percent copper alloy. The approach used has employed a scanning device, called a "corroscope," which permits a two-dimensional picture to be observed on an oscilloscope, in which is shown the potential distribution in the electrolyte immediately adjacent to the corroding metal surface. Since this potential field is directly related to the current lines flowing from point to point on the specimen, the picture allows direct observation of the location of anodic and cathodic regions on the surface.

N-19882\*

Battelle Memorial Inst.  
THE PLASTIC DEFORMATION OF SINGLE CRYSTALS OF ALUMINUM. R. D. Johnson, A. P. Young, W. B. Wilson and A. D. Schwöpe. (Summary rept.) October 10, 1952. i, 59p. photos., diagrs., tab. (Battelle Memorial Inst.)

This report describes a portion of the work performed in a fundamental investigation of creep in metals. The creep of single crystals of high-purity aluminum has been studied in the temperature range from 700° F to 1100° F. Experiments were carried out to investigate the possible effect of small amounts of prestraining by various methods on the creep properties of these aluminum single crystals. An experimental survey was conducted with various high-resolution X-ray diffraction techniques to determine the feasibility of studying the nature of plastic deformation in this manner.

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